

CLAIMS

1. A method for separating a metal-resin joint comprising the steps of:

(1) immersing an article comprising a metal-resin joint with a counter electrode in an alkaline solution; and

(2) applying a voltage over a certain time period between the metal portion of said joint and said counter electrode such that the potential of said metal portion is lower than that of a standard hydrogen electrode.

2. The method for separating a metal-resin joint in accordance with claim 1, wherein the voltage is applied over a certain time period between the metal portion of said joint and said counter electrode such that the potential of said metal portion is -2 V or higher and -0.6 V or lower relative to the standard hydrogen electrode.

3. The method for separating a metal-resin joint in accordance with claim 1, wherein said alkaline solution has a hydroxide-ion concentration of 0.1 M or higher and 15 M or lower and contains alkali metal cations.

4. The method for separating a metal-resin joint in accordance with claim 1, wherein said alkaline solution has a hydroxide-ion concentration of 3 M or higher and 7 M or lower and contains alkali metal cations.

5. The method for separating a metal-resin joint in accordance with claim 1, wherein said alkaline solution has a

temperature of 0°C or higher and 80°C or lower.

6. The method for separating a metal-resin joint in accordance with claim 1, wherein said step (2) comprises applying ultrasonic vibration to said joint.

7. The method for separating a metal-resin joint in accordance with claim 1, wherein said step (2) comprises applying peeling stress to said joint.

8. The method for separating a metal-resin joint in accordance with claim 1, wherein said metal portion comprises one or more selected from the group consisting of Al, Ti, Cr, Mn, Fe, Co, Ni, Cu, Zn, Mo, Rh, Pd, Ag, Sn, Re, Os, Ir, Pt, Au, Hg and Pb.

9. The method for separating a metal-resin joint in accordance with claim 1, wherein the resin portion of said joint comprises one or more selected from the group consisting of polyolefin, polyamide, polyester, polyacetal, polycarbonate, polyarylene ether, polyarylene sulfide, polysulphone, polyether ketone, polyimide, fluorin-containing polymer, natural rubber, phenol resin, polyurethane, silicone resin, and epoxy resin.

10. The method for separating a metal-resin joint in accordance with claim 1, wherein said joint is formed by (i) application of a resin material to a metal article, (ii) injection molding of a resin material onto a metal article, or (iii) bonding of a metal and a resin material by vulcanization.

11. The method for separating a metal-resin joint in

accordance with claim 1, wherein the metal portion and the resin portion of said joint are bonded with an adhesive or adhesive tape, and said adhesive or adhesive tape comprises one or more selected from the group consisting of vinyl acetate resin, acrylic resin, synthetic rubber, nitrile rubber, epoxy resin, cyanoacrylate resin, and polyvinyl chloride resin.

12. A method for recycling a waste article comprising the steps of:

(1) collecting a waste article comprising a metal-resin joint;

(2) immersing said joint and a counter electrode in an alkaline solution;

(3) separating the resin portion from the metal portion by applying a voltage over a certain time period between the metal portion of said joint and said counter electrode such that the potential of said metal portion is lower than that of a standard hydrogen electrode; and

(4) segregating the separated resin portion and said waste article from which the resin portion has been separated.

13. An apparatus for separating a metal-resin joint comprising:

(a) a container made of an alkali-proof material for accommodating an article comprising a metal-resin joint;

(b) an alkaline solution contained in said container;

(c) a counter electrode immersed in said alkaline

solution;

(d) a power source;

(e) a connecting member A for electrically connecting one terminal of said power source with the metal portion of said joint of said article comprising the metal-resin joint; and

(f) a connecting member B for electrically connecting the other terminal of said power source with said counter electrode.

14. The apparatus for separating a metal-resin joint in accordance with claim 13, wherein said connecting member A comprises a conductive material, and a portion of said conductive material is coated with an insulating oxide layer.

15. The apparatus for separating a metal-resin joint in accordance with claim 14, wherein said insulating oxide layer is coated with an insulating resin layer.